

What is claimed is:

1. An inspection method using an electron beam, comprising the steps of:
 - irradiating a sample on which a pattern is formed with an electron beam;
 - generating an inspection image and a reference image based on a secondary electron or a reflected electron emitted by the sample;
 - determining an abnormal pattern based on a difference in the halftone values in each pixel between the inspection image and the reference image;
 - determining a plurality of feature quantities of the abnormal pattern based on an image of the abnormal pattern; and
 - designating a range for classifying the type of the abnormal pattern based on the distribution of the plurality of feature quantities of the abnormal pattern.
2. The inspection method according to claim 1, wherein the range for classifying the type of the abnormal pattern is designated on the basis of a distribution chart created from the feature quantities of the abnormal pattern.
3. The inspection method according to claim 2, wherein the distribution chart is created after an inspection is carried out using a recipe for inspection including the designation of the range for classifying the abnormal pattern, and wherein a classification condition for automatically classifying the defect is modified on the distribution chart based on the feature quantities of the abnormal pattern detected by the inspection, the result of modification being stored in the recipe.
4. The inspection method according to claim 3, wherein the modification of the classifying condition for the automatic classification of the defect at least includes storing the content of designation including the range for classifying the type of the abnormal pattern designated on the distribution chart.
5. The inspection method according to claim 2, wherein the feature quantities

include the sum of halftone differences of each pixel determined on the basis of the inspection image and reference image of the abnormal pattern, and the sum of absolute values of the differentiated values of halftone values between each pairs of adjacent pixels determined on the basis of the inspection image including the abnormal pattern.

6. An inspection apparatus for irradiating a sample on which a pattern is formed with an electron beam, so that an inspection image and a reference image can be generated on the basis of a secondary electron or a reflected electron emitted by the sample, wherein an abnormal pattern is determined based on a difference in halftone values of each pixel between the inspection image and the reference image, the inspection apparatus comprising:

a feature-quantity calculating unit for determining a feature quantity of the abnormal pattern based on a difference image and the inspection image, the difference image being obtained from the difference in halftone values of each pixel between the inspection image and the reference image; and

a classification calculating unit for classifying the abnormal pattern into a plurality of groups based on the distribution of the feature quantity.

7. The inspection apparatus according to claim 6, wherein the classification calculating unit generates a distribution chart based on the feature quantity and then classifies the abnormal pattern into a plurality of groups.

8. The inspection apparatus according to claim 7, wherein the classification calculating unit, after an inspection is conducted during the process of preparing the recipe defining the content of inspection of the pattern, generates a distribution chart based on the feature quantity of the abnormal pattern detected during the inspection, and, upon designation of a range classifying the type of the abnormal pattern in the distribution chart, stores the content of the designation in

the recipe.

9. The inspection apparatus according to claim 8, wherein the classification calculating unit generates a distribution chart after an inspection is conducted using the recipe for inspection including the designation of the range for classifying the abnormal pattern, modifies the classification condition for the automatic classification of the defect on the distribution chart based on the feature quantity of the abnormal pattern that has been detected during the inspection, and stores the result of modification in the recipe.

10. The inspection apparatus according to claim 9, wherein the modification of the classification condition for the automatic classification of the defect at least includes storing the content of designation including the range for classifying the type of the abnormal pattern designated on the distribution chart.

11. The inspection apparatus according to claim 7, wherein the feature quantity includes the sum of halftone differences of each pixel determined on the basis of the inspection image and reference image of the abnormal pattern, and the sum of absolute values of the differentiated values of halftone values between each pairs of adjacent pixels determined on the basis of the inspection image including the abnormal pattern.

12. An inspection apparatus for irradiating a sample on which a pattern is formed with an electron beam, so that an inspection image and a reference image can be generated on the basis of a secondary electron or a reflected electron emitted by the sample, wherein an abnormal pattern is determined based on a difference in halftone values of each pixel between the inspection image and the reference image, the inspection apparatus comprising:

a calculating unit for obtaining a distribution chart in which a feature

quantity of the abnormal pattern is used as a parameter, the feature quantity being based on a difference image and the inspection image, the difference image being obtained from the difference in halftone values of each pixel between the inspection image and the reference image, and for classifying the abnormal pattern in a region set in the distribution chart; and

a display apparatus for displaying the distribution chart and the region.

13. The inspection apparatus according to claim 12, wherein the display apparatus displays an image of the abnormal pattern that is obtained by electron beam irradiation, as well as the distribution chart.

14. The inspection apparatus according to claim 12, wherein the display apparatus displays the inspection image, the reference image, and the difference image, as well as the distribution chart.